Note Title Prob 2.85 two events 2/7/2011

HW4 Q6: We know A, B are independent, prove that A, B^c are also independent

Ans: A, B are indep

$$\Rightarrow P(A \cap B) = P(A) \cdot P(B)$$

We need to prove

$$P(A \cap B^c) = P(A) \cdot P(B^c)$$

To that end, we notice

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

$$= P(A) - P(A) P(B)$$

$$= P(A) \cdot (1 - P(B))$$

$$= P(A) \cdot (P(B^c)) \quad \#$$

HW4Q8 Prob 3.13

X is a discrete R.V w. pmf $p_k = \frac{c}{k^2}$

for $k = 1, 2, 3, \ldots$

Q1: Find the value of C numerically.

Ans: $\sum_{k=1}^{\infty} p_k = 1 \Rightarrow c \cdot \sum_{k=1}^{\infty} \frac{1}{k^2} = 1.$

Since we do not know how to compute $\sum_{k=1}^{\infty}$, we <u>assume</u> $\sum_{k=1}^{\infty} = \sum_{k=1}^{100000}$

$$C \times \sum_{k=1}^{100000} \frac{1}{k^2} = C \times 1.6449 = 1$$

$$C = \frac{1}{1.6449} = 0.6079$$

$$\Rightarrow p_k = \frac{0.6079}{k^2} \quad \text{for } k = 1, 2, \ldots$$

Q2: $P(X > 4) = ?$

$$\text{Ans} = \sum_{k=5}^{\infty} \frac{0.6079}{k^2} = 1 - \sum_{k=1}^{4} \frac{0.6079}{k^2}$$

$$= 0.1346$$

Q3: $P(6 \leq X \leq 8) = ?$

Ans: $\sum_{k=6}^{8} \frac{0.6079}{k^2} = 3.879\%$

HW4 Q10 Prob. 3.20

Two dice are tossed & let X be the difference of the dots facing up

Find the pmf of X.

Ans:

	1	2	3	4	5	6
1	$1/36$					
2		$1/36$				
3						
4						
5						
6						

$$P(X=0) = \frac{1}{36} \times 6 = \frac{1}{6} = p_0$$

$$P(X=1) = \frac{1}{36} \times 5 = p_1$$

$$P(X=-1) = \frac{1}{36} \times 5 = p_{-1}$$

$$P(X=3) = \frac{3}{36} =$$

$$P(X=4) = \frac{2}{36}$$

$$P(X=5) = \frac{}{36}$$